



OFFICIAL STUDY GUIDE 2001 EDITION



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COLLEGE-LEVEL EXAMINATION PROGRAM

College Algebra

Description of the Examination

The Subject Examination in College Algebra covers the material that is usually taught in a one-semester college course in algebra. About half the exam is made up of routine problems requiring basic algebraic skills; the remainder involves solving nonroutine problems in which candidates must demonstrate their understanding of concepts. The exam includes questions on basic algebraic operations; linear and quadratic equations, inequalities, and graphs; algebraic, exponential, and logarithmic functions; and miscellaneous other topics. It is assumed that the candidate is familiar with currently taught algebraic vocabulary, symbols, and notation. The exam places little emphasis on arithmetic calculations, and it does not contain any questions that require the use of a calculator. However, the use of a scientific calculator (non-graphing, non-programmable) is permitted during the exam.

The exam consists of approximately 70 multiple-choice questions to be answered in two separately timed 45-minute sections.

Knowledge and Skills Required

The subject matter covered by the College Algebra exam is distributed approximately as follows.

	<i>Approximate Percent of Examination</i>
25%	Algebraic operations <ul style="list-style-type: none">Combining algebraic expressionsFactoringSimplifying algebraic fractionsOperating with powers and roots
20%	Equations, inequalities, and their graphs <ul style="list-style-type: none">Linear equations and inequalitiesQuadratic equations and inequalitiesSystems of equations and inequalities

➤ *Approximate Percent of Examination*

25%	Algebraic, exponential, and logarithmic functions and their graphs Domain Range Composition Inverse of functions
30%	Miscellaneous topics Theory of equations Sets Real numbers Complex numbers Sequences and series

Within the subject matter described above, questions on the exam require candidates to demonstrate the abilities given below in the approximate proportions indicated.

- Solving routine, straightforward problems (about 50 percent of the exam)
- Solving nonroutine problems requiring an understanding of concepts and the application of skills and concepts (about 50 percent of the exam)

Sample Questions

The 28 questions that follow are similar to questions on the College Algebra exam, but they do not appear on the actual exam. CLEP exams are designed so that average students completing a course in the subject can usually answer about half the questions correctly.

Before attempting to answer the sample questions, read all the information about the College Algebra exam on the preceding pages. Additional suggestions for preparing for CLEP exams are provided in Chapter 1.

Try to answer correctly as many questions as possible. Then compare your answers with the correct answers, given at the end of this examination guide.

Directions: Solve the following problems. Do not spend too much time on any one problem.

Notes: (1) Unless otherwise specified, the domain of any function f is assumed to be the set of all real numbers x for which $f(x)$ is a real number.

(2) i will be used to denote $\sqrt{-1}$.

(3) Figures that accompany the following problems are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that its figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

1. If $R = \{1,2\}$, $S = \{2,3,4\}$, and $T = \{2,4\}$, then $(R \cup S) \cap T$ is

- (A) $\{2\}$
- (B) $\{4\}$
- (C) $\{2,4\}$
- (D) $\{1,2,3,4\}$
- (E) The empty set

(A) (B) (C) (D) (E)

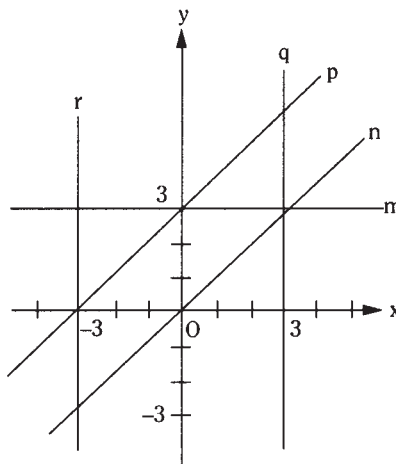


Figure 1

2. Which of the lines in Figure 1 is the graph of $x = 3$?

- (A) m
- (B) n
- (C) p
- (D) q
- (E) r

(A) (B) (C) (D) (E)

3. If $f(x) = 2x - 1$, then $f(3x) =$

- (A) $3x - 1$
- (B) $6x - 1$
- (C) $6x - 3$
- (D) $6x^2 - 1$
- (E) $6x^2 - 3x$

(A) (B) (C) (D) (E)

4. If $x + 2 = y$, what is the value of $|x - y| + |y - x|$?

- (A) -4
- (B) 0
- (C) 2
- (D) 4
- (E) It cannot be determined from the information given.

(A) (B) (C) (D) (E)

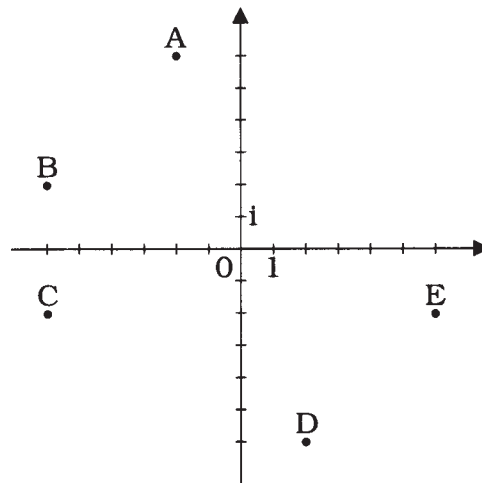


Figure 2

5. Which point in Figure 2 represents the complex number $6 - 2i$?

- (A) A
- (B) B
- (C) C
- (D) D
- (E) E

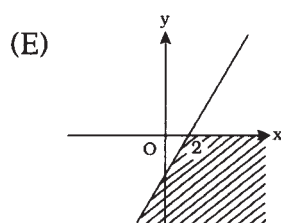
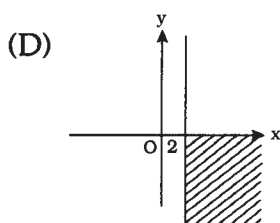
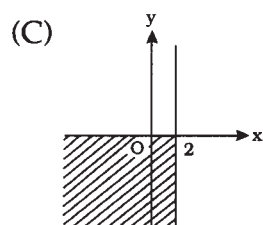
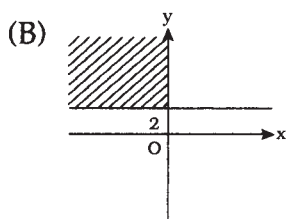
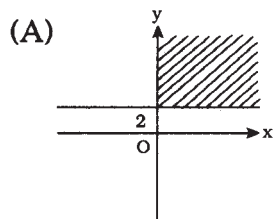
(A) (B) (C) (D) (E)

6. Where defined, $(x^a)^a =$

- (A) $x^{\frac{a}{2}}$
- (B) x^{a^2}
- (C) x^{a+2}
- (D) x^{2a}
- (E) $2x^a$

(A) (B) (C) (D) (E)

7. Which of the shaded regions below represents the graph of $\{(x,y) \mid x \geq 2 \text{ and } y \leq 0\}$?



(A) (B) (C) (D) (E)

8. Where defined, $\frac{x^3-1}{x-1} =$

- (A) $x+1$
 (B) x^2+1
 (C) x^2-x+1
 (D) x^2-x-1
 (E) x^2+x+1

(A) (B) (C) (D) (E)

9. $\sum_{k=-1}^3 k^2 =$

- (A) 5 (B) 10 (C) 13 (D) 14 (E) 15

(A) (B) (C) (D) (E)

10. Where defined, $\frac{x - \frac{4y^2}{9x}}{\frac{3x}{2} + y} =$
- (A) $\frac{9x(3x-2y)}{2y(3x+2y)}$
- (B) $\frac{2(3x+2y)^2}{9(3x-2y)}$
- (C) $\frac{3x+2y}{9}$
- (D) $\frac{2(3x-2y)}{9x}$
- (E) $\frac{(3x-2y)(3x+2y)^2}{18x}$ (A) (B) (C) (D) (E)
11. For what real numbers x is $y = 2^{-x}$ a negative number?
- (A) All real x
- (B) $x > 0$ only
- (C) $x \geq 0$ only
- (D) $x < 0$ only
- (E) No real x (A) (B) (C) (D) (E)
12. If $\log_x 16 = 8$, then $x =$
- (A) $\frac{1}{2}$
- (B) $\frac{1}{\sqrt{2}}$
- (C) $\sqrt{2}$
- (D) 2
- (E) $2\sqrt{2}$ (A) (B) (C) (D) (E)
13. The set of all real numbers that satisfy the inequality $|x - 2| \leq 5$ is
- (A) $\{x: -5 \leq x \leq 5\}$
- (B) $\{x: -3 \leq x \leq 7\}$
- (C) $\{x: -7 \leq x \leq 3\}$
- (D) $\{x: x < -5\}$
- (E) $\{x: x < -7 \text{ or } x > 3\}$ (A) (B) (C) (D) (E)

14. If $f(x) = 2x + 1$ and $g(x) = 3x - 1$, then $f(g(x)) =$
- (A) $6x - 1$
(B) $6x + 2$
(C) $x - 2$
(D) $5x$
(E) $6x^2 + x - 1$
- (A) (B) (C) (D) (E)
15. If the remainder is 7 when $x^3 + kx^2 - 3x - 15$ is divided by $x - 2$, then $k =$
- (A) 5
(B) 6
(C) 7
(D) 9
(E) 11
- (A) (B) (C) (D) (E)
16. The set of all values of b for which the equation $4x^2 + bx + 1 = 0$ has one or two real roots is defined by
- (A) $b > 4$
(B) $b < 4$
(C) $b \geq 4$ or $b \leq -4$
(D) $b > 4$ or $b < -4$
(E) $b \geq 1$ or $b \leq -1$
- (A) (B) (C) (D) (E)
17. Given the two complex numbers $Z = p + qi$ and $\bar{Z} = p - qi$, where p and q are real numbers different from zero, which of the following statements involving Z and \bar{Z} must be true?
- (A) $Z = -\bar{Z}$
(B) $(\bar{Z})^2$ is a real number.
(C) $Z \cdot \bar{Z}$ is a real number.
(D) $(\bar{Z})^2 = Z^2$
(E) $Z^2 = -(\bar{Z})^2$
- (A) (B) (C) (D) (E)

18. $\frac{(n+1)!}{n!} - n =$

- (A) 0
(B) 1
(C) n
(D) $n + 1$
(E) $n!$

(A) (B) (C) (D) (E)

19. In how many points do the graphs of $x^2 + y^2 = 9$ and $x^2 = 8y$ intersect?

- (A) One
(B) Two
(C) Three
(D) Four
(E) More than four

(A) (B) (C) (D) (E)

20. $\frac{1+2i}{1-2i} =$

- (A) $\frac{4-3i}{-3}$
(B) $\frac{-3+4i}{5}$
(C) 1
(D) $\frac{3-4i}{5}$
(E) $\frac{4-3i}{3}$

(A) (B) (C) (D) (E)

21. A colony of bacteria starts with 2 bacteria at noon. If the number of bacteria triples every 40 minutes, how many bacteria will be present at 4:00 p.m. on the same day?

- (A) 486 (B) 729 (C) 1,458 (D) 46,656 (E) 118,098

(A) (B) (C) (D) (E)

$$\begin{cases} 2x + y - z = 3 \\ x + 3y - 2z = 7 \\ 3x - y + 4z = 11 \end{cases}$$

22. What is the value of z in the solution set of the system of equations above?

(A) $-\frac{11}{3}$

(B) $-\frac{3}{2}$

(C) 1

(D) 2

(E) 3

(A) (B) (C) (D) (E)

23. Which quadrants of the plane contain points of the graph of $2x - y > 4$?

(A) First, second, and third only

(B) First, second, and fourth only

(C) First, third, and fourth only

(D) Second, third, and fourth only

(E) First, second, third, and fourth

(A) (B) (C) (D) (E)

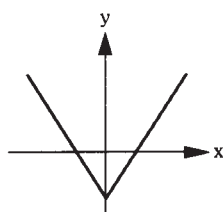
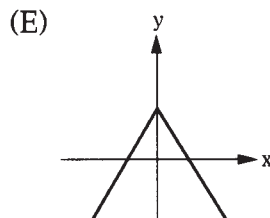
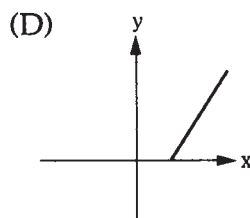
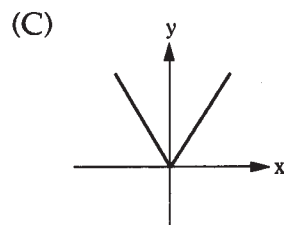
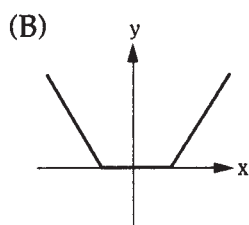
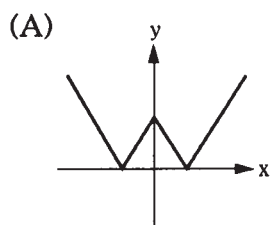


Figure 3

24. Figure 3 is the graph of $y = f(x)$. Which of the following is the graph of $y = |f(x)|$?



(A) (B) (C) (D) (E)

25. If x , $3x + 2$, and $8x + 3$ are the first three terms of an arithmetic progression, then $x =$

(A) -1

(B) $-\frac{1}{5}$

(C) 0

(D) $\frac{1}{3}$

(E) 3

(A) (B) (C) (D) (E)

26. What is the middle term in the expansion of $\left(x - \frac{1}{x}\right)^6$?
- (A) $20x^3$
(B) $\frac{20}{x^3}$
(C) $-15x^2$
(D) -15
(E) -20 (A) (B) (C) (D) (E)
27. A driver decides to stop her car by tapping the brake pedal once every 5 seconds. After each tap of the brake pedal her speed is $\frac{3}{4}$ of what it was before the tap. If the initial speed of the car is 60 miles per hour (88 feet per second), how many feet will the car travel from the first tap of the brake until the car comes to a stop?
- (A) 264 (B) 440 (C) 900 (D) 1,320 (E) 1,408
- (A) (B) (C) (D) (E)
28. The set of real solutions of $\frac{2}{3-x} = \frac{1}{3} - \frac{1}{x}$ is
- (A) the empty set (B) $\{3\}$ (C) $\{-3\}$
(D) $\{3, -3\}$ (E) $\{3i, -3i\}$ (A) (B) (C) (D) (E)

Study Resources

To prepare for the College Algebra exam, you should study the contents of at least one college level algebra textbook. These textbooks can be found in most college bookstores. You would do well to consult two or three textbooks because they vary in content, approach, and emphasis. When selecting a textbook, check the table of contents against the “Knowledge and Skills Required” section on pages 1-2.

Additional suggestions for preparing for CLEP exams are provided in Chapter 1.

Answers to Sample Questions

College Algebra

- | | |
|-------|-------|
| 1. C | 26. E |
| 2. D | 27. D |
| 3. B | 28. A |
| 4. D | |
| 5. E | |
| 6. B | |
| 7. D | |
| 8. E | |
| 9. E | |
| 10. D | |
| 11. E | |
| 12. C | |
| 13. B | |
| 14. A | |
| 15. A | |
| 16. C | |
| 17. C | |
| 18. B | |
| 19. B | |
| 20. B | |
| 21. C | |
| 22. E | |
| 23. C | |
| 24. A | |
| 25. D | |
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